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LII.—*On a Young Specimen of Pelagonemertes Rollestoni.*  
By H. N. MOSELEY, Naturalist on board H.M.S. 'Challenger.'

[Plate XI.]

ON June 5, 1875, in lat.  $34^{\circ} 58' N.$ , long.  $139^{\circ} 30' E.$ , about halfway between Vries Island, Oosima, and Cape Sagami, the trawl was used by H.M.S. 'Challenger' in from 755 to 420 fathoms. A young specimen of a peculiar pelagic Nemeritean, which has been described by me (Ann. & Mag. Nat. Hist. ser. 4, vol. xv. p. 165, March 1875) under the name of *Pelagonemertes Rollestoni*, in honour of my friend and instructor Prof. Rolleston, was found by Dr. von Willemoes-Suhm adhering to the net, and by him handed over to me for examination. The adult specimen before procured and described was in a similar manner found adhering to the trawl-net after a deep-sea dredging by Dr. von Willemoes-Suhm.

The animal was very much smaller than the one obtained before, measuring only 13 millims. in extreme length and 11 millims. in extreme breadth, and about 1 millim. in extreme thickness. It was in good preservation when found, and living; and being extremely transparent, much more of its structure could be observed than in the case of the more full-grown specimen. Unfortunately, an attempt to preserve the specimen by treatment with perosmic acid and subsequent

action of glycerine failed, and the specimen perished. The trawl came up late in the evening, when only an hour of daylight remained; the examination made was thus a hasty one.

The animal showed the same feeble pulsating movements which had been shown by the adult.

The external gelatinous investment of the body was perfectly transparent; and none of the peculiar corrugations of a thin superficial epidermic layer were visible as in the adult specimen. The contours of the body were well preserved, including those of the hinder portion, which was broken in the specimen before obtained.

The fore part of the body is wide, with rounded margins; the posterior narrowed, with a series of indentations on its margin corresponding to the successive pairs of diverticula of the digestive tract. At the extreme hinder termination of the body is a shallow notch, at the bottom of which is the anus.

The mouth, which is a simple opening at the apex of a small, short, conical protuberance, was situate just in front of the nerve-ganglia on the ventral surface of the body (it is not shown in the figure, which represents the animal from the dorsal aspect). The central canal of the digestive tract terminated in front in a wide rounded blind end, and tapered gradually to the anus at the posterior end of the body.

The lateral diverticula in this young specimen were evidently in an immature condition; and the successive pairs showed successive stages of development, the most anterior being the most fully formed. This most anterior pair is the only one which shows a commencement of ramification at the peripheral extremities. The ramifications, so ample and well marked in the adult worm, are seen here to be developed as caecal buds from the outer ends of the long diverticula. The diverticula themselves, of which five pairs were present in the young specimen here figured, arise, as can be seen from the figure (Pl. XI. fig. 1), as simple lateral buds from the central digestive tube. These buds gradually increase in length, their peripheral caecal ends being always larger than the tubes connecting these with the central digestive tract; and eventually these caecal ends give off buds and form ramifications. A slight enlargement in the rectum situate just anteriorly to the anus, and shown in the figure, probably represents the spot where a sixth pair of diverticula were about to bud off from the digestive tube. The diverticula, with the exception of the first pair, were not placed exactly opposite one another, the right diverticulum in each pair being situate anteriorly to the corresponding left one.

The digestive tract was filled with a dark reddish brown

matter, consisting of large granules and oil-globules. The contents of the diverticula were darker and more opaque, and contained numerous clear oily globules of a bright yellow and bright red colour, mingled with similar opaque globules (fig. 4, *a*). The brightly coloured globules exactly resembled those of the main tract. Similar coloured globules occur in larval Nemertines; and I have observed them also in a marine Planarian larva, possibly that of a *Thysanozoon*, or the Planarian larva described by Johannes Müller from the Mediterranean, supposed to be that of *Eurylepta* (Claus, 'Grundzüge der Zoologie,' p. 286).

The sac of the proboscis corresponded exactly with that described in the adult. It was here found to terminate posteriorly in a blunt point at a short distance from the hinder end of the body. The fluid contained in it appeared transparent and without corpuscles. The proboscis itself could be carefully examined in the present transparent specimen. It was without stylets and quite simple, invaginated in the usual manner; it was not seen fully protruded, but, when so protruded, must be slightly longer than the animal's body; it has an outer pellucid gelatinous investment and an inner muscular layer (fig. 5). No retractor muscle was observed to be connected with it.

The nervous system consists of two pairs of ganglia, of which the upper are by far the larger and give off the stout nerve-cords. The cords, stretching backwards on either side, unite with one another above the rectum at the hinder end of the body. The nerve-ganglia are shown enlarged in fig. 3. No sense-organs of any kind were detected. On the outer margin of the large superior ganglion (fig. 3) a series of elongate pellucid cells were arranged side by side perpendicularly to the curved surface which they form. Abundant fine nerves were given off from the entire length of the nerve-cords to the surface of the body, the muscles &c. arising both from the inner and outer margins of the cords. At the origins of these nerves from the cords there are very slight swellings on the margin of the cord; but these do not contain any nerve-cells. The nerves are very fine, hyaline, with a nearly rectilinear course, and they generally divide into two near their points of distribution; they are never tortuous or much ramified. Terminal organs on the surface of the body in connexion with the nerves were carefully sought for, but could not be found.

A pair of vascular trunks follow the course of the nerve-cords through the body, lying internally to them and beneath them. The vessels unite with one another posteriorly, as do the nerve-cords; their course is undulating. Just behind the

nerve-ganglia the vascular trunks are enlarged into wide reservoirs. No branches of these vessels were seen; and though the animal was living when examined, no pulsation in them was observed. The vessels had a pellucid wall, in which were imbedded elongate oval nuclei (fig. 4, *b*), but which otherwise appeared structureless. No motion of any fluid within the vessels was seen.

Although the specimen under description was evidently so immature, well developed ovaries were present, the specimen being a female, as was the adult one before obtained. The ovaries follow in their disposition the vascular trunks so closely as to appear as if connected with them. The ovaries are simple ovoid sacs with a distinct wall (fig. 2), filled with ova (in various stages of development) and granular matter. A dark irregular fissure appeared on the centre of each ovary as viewed from the dorsal surface, which I believe to be an opening by which the cavity of the organ communicates with the exterior, thus dorsally. The ovaries were not quite regular in disposition, an extra anterior one being developed on the right side of the body. In the interspace between the most anterior and larger pair of intestinal diverticula and the next posterior pair were four pairs of ovaries, whereas in the succeeding corresponding interspaces were only single pairs of these organs. In the adult specimen described in the 'Annals' (March 1875), a single ovarian sac only was present in each interspace between the diverticula of the digestive tract. It would therefore seem probable that on further development three pairs of diverticula would have budded out between the first and second pairs in the present specimen.

The muscular system consists of a series of excessively fine transversely or circularly disposed fibres, which are external in position to a series of broad band-like longitudinal muscles. The longitudinal muscular bands are in close relation with the proboscis-sac. Their exact disposition was not made out, and their arrangement as shown in the figure will possibly need correction.

On the whole, *Pelagonemertes* is a form of considerable zoological importance.

In the flattened form of its body and in its dendrocoelous digestive tract the animal resembles Planarians. Amongst the Rhabdocœles the Prostomea possess an exsertile proboscis like that of Nemertines; but such an organ is present in no Dendrocoele. In all particulars—in being unisexual, in the simplicity of the generative organs, in the form of the nervous and vascular systems and of the proboscis, in the position of

the mouth and presence of an anus—in all essential structures *Pelagonemertes* is most distinctively a Nemertine. Only in its remarkable dendrocœle intestine does it differ from all other Nemertines, and (but this is of far less importance) in the modification of its tissue into the peculiar hyaline gelatinous condition which is characteristic of so many otherwise most widely differing pelagic animals.

The development of the dendrocœle intestine is very remarkable, in that the lateral ramifications are apparently to be regarded as a series of buds occurring successively from before backwards from a previously straight digestive tract such as exists in other Nemertines. In this the digestive tract differs entirely from that of dendrocœlous Planarians, such as *Leptoplana tremellaris*, in which, as we know from the observations of Keferstein ("Beiträge zur Anatomie und Entwicklungsgeschichte einiger Seeplanarien von St. Malo," Abhandl. der k. Gesellschaft der Wiss. zu Göttingen, 4ter Band, Göttingen, 1868, Taf. iii. figs. 19, 20, 21, text p. 34), "the great yelk-balls arrange themselves in the embryo with regularity and map out the form of the future digestive tract," the peripheral ramified part of the tract being formed at the same time as the central portion.

The peculiar form of the front of the body of *Pelagonemertes* may be regarded as an instance of the excessive formation of the head-lappets of many Nemertines. In having no ciliated sacs and an unarmed proboscis, *Pelagonemertes* resembles *Cephalothrix*; but the animal must evidently be placed in a new family of Nemertines, for which I propose the term *Pelagonemertidæ*, thus characterized:—

***Pelagonemertidæ*, fam. nov. H. N. M.**

Animal pelagic in habit. Body gelatinous, hyaline, broad and flattened. Proboscis unarmed. Ciliated sacs absent. Special sense-organs absent. Digestive tract dendrocœlous.

The occurrence of a second specimen of *Pelagonemertes* off Japan shows that the animal has a wide distribution. It was found on both occasions adhering to the trawl-net, and is, from its very slight consistency, easily overlooked. Hence it may have been often missed by us, and probably is as widely distributed as other oceanic forms. Since it has never been taken, by former observers of pelagic animals nor by us, in the tow-net, it is very probable that it occurs only in deep water, and does not come to the surface; it is, however, most evidently not an inhabitant of the sea-bottom.



POSTSCRIPT. Since the above was written, my attention has been directed by Dr. von Willemoes-Suhm to Lesson's original figure of *Pterosoma* in the 'Zoology of the Voyage of the Coquille' (which work we have been able to consult, with a splendid series of similar publications, in the Hawaiian Government Library at Honolulu), and to the many points of resemblance between *Pterosoma* and *Pelagonemertes*.

*Pterosoma plana* is described by M. Lesson, 'Voyage de la Coquille, Zoologie,' Paris 1830, p. 254, and figured, pl. iii. figs. 3 and 3 bis.

*Pterosoma* was obtained in great abundance by Lesson between the Moluccas and New Guinea, August 31st, 1828.

The animals measured 3 inches and some lines in length, 18 lines in breadth, and 3 to 4 lines in thickness. In general form and gelatinous structure *Pterosoma* resembles closely *Pelagonemertes*, further in that a series of polygonal areas are marked out on its surface. The spirally-wound organ described as a tube, which is indicated in the figure of *Pterosoma*, can scarcely be any thing else than the proboscis of a Nemertine—the mouth, at the extreme end of the body, being probably the aperture of the proboscis-sac, and the fusiform nucleus the sac itself. On the other hand, it is difficult to conceive that Lesson, with a number of specimens available for examination, could have missed seeing the very conspicuously burnt-sienna-coloured ramified intestine of *Pelagonemertes*, had such been present in his *Pterosoma*. Further, in *Pterosoma* a pair of elongate, closely opposed eyes are described and figured, having transparent coloured corneae.

On the whole, now that a pelagic Nemertine is known to exist, there seems little doubt that the animal seen and figured by Lesson was a Nemertine and not a mollusk; but it seems to have been a distinct form, with a pair of eyes and an unbranched digestive tract.

#### EXPLANATION OF PLATE XI.

Representing various structures occurring in a young specimen of  
*Pelagonemertes Rollestoni*.

Fig. 1. *Pelagonemertes Rollestoni*, enlarged, viewed from the dorsal surface; the proboscis is partly extruded. P, proboscis; Pr.S, sac of proboscis; I. P, invaginated portion of proboscis within the proboscis-sac; G, superior nerve-ganglion; N.C, nerve-cords; V, vascular trunk (the upper V points to an enlargement of the vessel lying just posteriorly to the superior nerve-ganglion); I, intestine; D, diverticula of intestine; O, O, ovaries; C.M, circular muscles; L.M, longitudinal muscles.

Fig. 2. One of the ovaries, enlarged. The dark irregular line on the centre represents what is probably an aperture for the discharge of ova.

- Fig. 3.* The nervous ganglia and ring, much enlarged. A, superior ganglion; B, inferior ganglion.
- Fig. 4.* *a*, groups of brightly coloured fatty globules forming the contents of the diverticula of the intestine; *b*, portion of the vascular trunk, much enlarged.
- Fig. 5.* Portion of the invaginated proboscis, much enlarged. *a*, external gelatinous layer; *b*, internal muscular layer; *c*, cavity continuous with that of the proboscis-sac; within these the invaginated portion of the proboscis with the layers reversed; *b*, internal muscular layer; *a*, external gelatinous layer; *d*, central tube filled with dark amorphous matter (from the proboscis-sac?).

LIII.—*On three new and curious Forms of Arachnida.* By the Rev. O. P. CAMBRIDGE, M.A., C.M.Z.S., Hon. Memb. N.Z. Inst.

[Plate XIII.]

THE three singular Arachnids described in the following pages belong to widely separated localities. The *first* (*Calypstostoma Hardii*, upon which I have based a new genus of the family Trombidides in the order Acaridea) is a British form, discovered by Mr. James Hardy (of Old Cambus, Berwickshire) on Cheviot Hill, Northumberland, and sent to me among numerous examples of spiders. The *second* (*Westwoodia obtecta*) is of the order Phalangidea, and appears to me incapable of inclusion in any family or genus hitherto characterized; it is altogether one of the most remarkable Arachnids that have lately come under my notice: owing, however, to the minuteness of the creature itself (less than 1 line in length), and the necessarily still more minute and curiously concealed mouth-parts, the special structure of these important features is uncertain; and their minuteness also almost precludes the possibility of satisfactory dissection. Probably, when in use, the parts of the mouth (the palpi and falces at least) could be extruded; so that we must await the examination of living specimens for further knowledge of their structure. This minute Arachnid was received from Otago (New Zealand), where it was found by Capt. F. W. Hutton, and kindly sent to me among other examples of this class. The *third* is also of the order Phalangidea, family Cyphophthalmides (Joseph), genus *Cyphophthalmus* (ejusd.), of which it is a very distinct new species; it was sent to me, among numerous other new and rare Arachnids, from Ceylon, by Mr. G. H. K. Thwaites. For this, which in its general appearance bears a strong resemblance to some forms of Hemiptera heteroptera, I propose the name of *Cyphophthalmus cimiciformis*.